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(54) **Game machine data transfer system.**

(57) A system of data transfer is provided for use in a game machine environment such as a casino in which a number of game machines are provided and players are free to move from one to another. Each player carries a smart card or data transfer unit (20) containing a memory (26) and a processor (22) having addressing, control, protection and/or encryption circuitry. An interface unit (40) (FIG.3) associated with each game machine (10), is adapted to receive the card (20) for accessing the data in the card memory (26). A central data processor (82) also is adapted to receive the card (20), and has means to access the data. The processor (22) is organized to record machine data from the game machine (10) in the data memory (26) of the card (20) and to modify player information in the data memory. The memory (26) may store data regarding cash flow, security violations, machine malfunctions and/or volume of play attributable to an individual player. Machine performance may be monitored and the eligibility of a player to receive premiums as a play incentive may be determined.

When the cards (20) are returned to the central data processor (82) they provide casino management a detailed overview of the casino organization and permit much statistical analysis of player and machine behaviour. The cards can be used as a means of paying winnings to players, with the players returning the cards to the central data processor (82) at a

cashier's station to redeem their winnings.

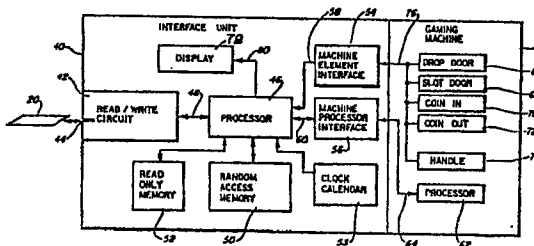


FIG. 3

former case the winnings may be paid out in the usual way in coins by the machine or may be simply recorded on the portable data unit for encashment later when the portable data unit is presented to a cashier who inserts it into the central data processor to read the information stored thereon.

The exchange of information between the portable data units and the game machines via their interfaces according to the invention is essentially a two-way exchange. The game machine, through its interface, reads from the portable data unit player information including, preferably, player account information. It writes to the portable data unit machine information and modifies the player information so that when the portable data unit is subsequently presented to the central data processor the processor can obtain a range of information concerning player activity and game machine performance.

Each player or employee may thus carry a portable data unit that will permit the transmittal of player information and game machine information between game machines and a central data system. The data unit may also contain player account and win information. Machine identification and performance information can be transmitted and stored in the central data processor.

The portable data unit is typically a smart card, which is a device generally the shape and size of a standard credit card, which contains solid-state memory, as well as circuitry to enable the memory to be written to, read from and otherwise manipulated. Examples of such devices are disclosed in U.S. Patents 4,675,516, 4,725,924, 4,727,246, 4,733,061 and 4,764,666.

A very significant advantage of the invention is that a large central computer can be replaced by a minicomputer, or in some cases by one or more desktop personal computers. Since the need for real-time on-line on-line communication with all the game machines does not exist, the data processing functions can be handled easily by the small computer system. Since the communication of data from the game machines to the computer system is not limited by a network of data communication cables, game machines need not to be on the same premises as, or even in the near vicinity of, the computer.

The elimination of the data communication hardware and the large central computer makes possible the automation of the accounting, security and player tracking even for small establishments, and to operators that have small numbers or widely dispersed gaming machines which could not otherwise justify the cost of such a system.

Drawings

FIG. 1 is a perspective view of a gaming machine;

FIG. 2 is a partially cut away perspective view of a portable data transfer unit being part of a system according to the invention;

FIG. 3 is a functional block diagram of a gaming machine interface circuit for use with

the data transfer unit of FIG. 2, along with a portion of the gaming machine circuitry;

FIG. 4 is a functional block diagram of a central data processing system for use with the data transfer unit of FIG. 2;

FIG. 5 is a diagram of memory organization for a player data transfer unit as in FIG. 2;

FIG. 6 is a diagram of memory organization for a machine data transfer unit as in FIG. 2; and

FIG. 7 is a diagram of a down load data transfer unit as in FIG. 2.

Best Mode

In FIG. 1 is provided a view of a typical gaming machine 10. The machine 10 as represented in FIG. 1 is a slot machine which in normal operation accepts a coin or token in a slot 12 and responds to a pull on a handle 14 by a player by depositing one or more coins in a coin tray 16 if a winning play is registered. A win or lose indication is provided to the player by a display 18 that in a slot machine normally takes the form of a group of mechanical reels or a video display. Although the gaming machine 10 shown in FIG. 1 is a slot machine, it should be understood that the invention can be equally applied to a wide variety of casino-type gaming machines including video poker and 21 machines as well as other coin operated amusement games.

FIG. 2 provides a partially cut away view of the preferred embodiment of a portable data transfer unit 20. The data unit 20 includes a microprocessor 22 connected by data lines 24 to a number of non-volatile random access semiconductor memories 26. Microprocessor 22 is connected to an interface circuit 28 by a group of data and control lines indicated generally at 30. Communication to external devices is facilitated by a group of contacts 32 connected to the interface circuit 28. Preferably, these contacts conform to an industry standard such as ISO/DIS 7816/1 and 7816/2 and include contacts for: chip select signals; clock input signals; a data input signal; a data output signal; a power supply input; a status input signal, a ground line and a memory type signal.

The circuit elements 22, 26 and 28 can in effect function as a small computer system by, for example: accepting data and control signals from external devices connected to contacts 32; using the microprocessor 22 to process the data; reading and writing data into memory 26 and transmitting data and control signals via the interface circuit 28 to the external devices.

In the embodiment of FIG. 2, the circuit elements 22, 26 and 28 are mounted on a bottom sheet 34 and covered or sealed within the unit 20 by a cover sheet 36 with a portion 38 left open to provide access to the contacts 32. Preferably the data unit 20 has outer dimensions that correspond to a standard credit card. Examples of various types of structures that can be used for the portable data unit 20 are shown in U. S. patents 4,725,924, 4,727,246, 4,733,061 and 4,764,666.

Although the preferred embodiment of the portable data unit 20 has been described above in terms of an IC card or smart card, other configurations or

loads that amount into field 98. By the same token, the information in the field 98 can be used by the casino employee using terminal 86 to pay or credit the player when the card is redeemed or presented for payment.

Since security is an extremely important consideration in casino operations, the memory 90 can also include an encryption data field 100 which can contain encryption keys or algorithms. As will be described in more detail later, the data in field 100 can be used by the interface unit 40 to ensure that the card 20 is an authorized card. Also the data in the other fields of the memory 90 can be encrypted such as the debit/credit field 98 in order for example to discourage players from taking the card 20 home to increase on their own the value of the credits in that field.

After the player card 20 having memory organization 90 is initialized, it is ready for use with the gaming machine 10. The player will insert the card 20 into the read/write circuit 42 of the interface unit 40 as shown in FIG. 3 via slot 44. The read/write circuit 42 is under the control of the microprocessor 46 and causes this circuit 46 to transmit to the microprocessor 22 on the card 20 the appropriate instructions so that the identifying data in fields 92 and 94 are transmitted to the processor 46. Depending upon the level of security desired the processor can also access encryption keys or passwords from field 100 to use with an encryption algorithm or password procedure stored for example in ROM 52 to determine if the card 20 is authorized. The information stored in field 100 can additionally include access control codes and codes defining the functions and access capabilities of the card 20. Alternatively the card microprocessor 22 can encrypt using, for example, one of the NBS encryption standards the data being transmitted to the processor 46 and the processor 46 can in turn use a matching algorithm to decrypt the data.

Once the card 20 has established communication with the interface unit 40 and been identified as a player type card, the interface unit 40 will make available to the gaming machine 10 the debit or credit information contained in card field 98. In the embodiment shown in FIG. 3, this information is transmitted by way of the machine interface 56 to the gaming machine microprocessor 62. In gaming machines of this type the player has the option of selecting by means of a control button or switch indicated at 101 on the machine housing 10, credit or coin operation.

One of the more significant features of the invention is a comprehensive player tracking capability. As the player operates the machine, data representing game play is transmitted by the interface unit to the memory 90 of the card 20. For example, the identification of the machine being played is stored in a data field 104 as shown in FIG. 5. In the preferred embodiment of the invention the identification of the last ten machines 10 played are stored in fields 104. In addition, specific information relating to the games played is also stored in card memory 90. In the embodiment shown in FIG. 5, eight data fields indicated generally at 106 are

provided to store information relating to player activity. Here, there is one field 106 for each denomination: nickel, dime, quarter, half-dollar, dollar, \$5, \$25 and \$100. Within each field 106 there is a group of subfields for storing the number of: coins played 108, coins paid out 110, the number of games played 112 and the number of coins paid by attendants 114 for each denomination. Also, the time of play in minutes for that denomination is stored in a subfield 116. It will be understood, of course, that the amount and types of data stored in the game play fields such as 106 of memory 90 can be varied to suit a particular casino operating environment. In addition to the play data discussed above the memory 90 contains a data field 118 to store information relating to the jackpots or other major prizes won by the players.

In the preferred embodiment of the invention, the interface unit 40 performs the calculations necessary to compute the players bonus or premium award status and stores that status in a bonus data field 102 in the card memory 90. The bonus status can be based on a wide variety of information and criteria such as the number of games or time the machine 10 is played as received from the machine processor 62 along with other data obtained from the card memory 90. For example, player bonus status can be calculated on the player's "volume of play" which can include one or more of the following factors: coins played, number of handle pulls, amount won, length of time played, payouts, length of time played without a win, etc. Use of the processor 46 in the interface unit 40 to perform this function has a number of advantages including immediate access to relevant information about the individual player and a complete operational separation and non-interference with the operation of the gaming machine 10.

The use of the card or data transfer unit 20 enhances the data gathering ability of the gaming machine data transfer system when the player redeems the card 20. Typically the player will hand the card 20 to a casino employee who will insert the card 20 into the system interface 84 of the central data system of FIG. 4. Upon receiving and verifying the data from card 20 the central data processor 82 can, either automatically or at the request of an employee operating the terminal 86, clear selected portions of memory 90, thus preparing the card 20 for future data collection. The system of FIG. 4 can also display on display 88 or print out reports on information and calculations based on the data thus collected. At this point the player, based on the data displayed, can receive payment or credit derived from the information on the card 20. In particular, the player's individual account status is printed out or displayed on display 88 so that the casino employee can determine what prizes, premiums or awards that the player may be entitled to. If such awards are made by the employee, this information is entered into the system of FIG. 4 via the terminal 86 resulting in a decrementing of the bonus data in field 102 of card memory 90. As with the interface unit 40, it is the system interface 84, which is functionally similar in construction to interface 40, that actually performs

interface unit 40 each time the card 20 is used with a gaming machine 10 and as such provides the central data system of FIG. 4 and hence casino management with valuable information regarding card usage. Although not shown in FIGS. 5 and 6 it is considered desirable in the preferred embodiment of the invention to include a similar data field in the player card memory 90 and the machine data memory 120.

From the above discussion it is apparent that the use of the portable data unit or card 20 having a data processing capability in combination with computer controlled gaming machine interface units 40 provides a gaming machine information transfer system of great flexibility and low cost with the ability to generate useful information for casino management. Although the invention has been described in terms of its use with gaming machines that return money to the player, such as slot machines or video poker machines, many of the aspects of the invention would apply to coin-operated amusement type games as well. Thus, certain aspects of the invention relate to game machines in general which include gaming machines along with amusement games.

Claims

1. A data transfer system for use with a plurality of game machines (10) comprising:
 a plurality of portable data units (20) for carrying by players, each portable data unit (20) comprising a data memory (26) containing player account information relevant to its associated player;
 an interface unit (40) incorporated into each game machine (10) for receiving the portable data unit (20) carried by a player and for reading from the data memory (26) of that portable data unit (20) player information; and
 a central data processor (82) for receiving the portable data unit (20) carried by a player and reading therefrom the player information, CHARACTERISED IN THAT each interface unit (40) includes means for transmitting to the data memory (26) of a portable data unit (20) received therein machine data; each portable data unit (20) or each interface unit (40) further comprises a processor (22 or 46) for recording machine data in the data memory (26) of a portable data unit (20) received in an interface unit (40) of a game machine (10) and for modifying player information stored in the said data memory (26) in response to selected machine data transmitted to the portable data unit (20) by the interface unit (40) in which it is received; and
 the central data processor (82) further includes means for reading from a portable data unit (20) inserted therein machine data relating to the game machines (10) with which the portable data unit (20) has been used.

2. A system according to claim 1, wherein each portable data unit (20) comprises a processor (22) for modifying the player informa-

tion stored in the data memory (26) of the portable data unit (20) when received in an interface unit (40) in response to the selected machine data transmitted to the portable data unit (20) by the interface unit (40).

3. A system according to claim 1, wherein each interface unit (40) comprises a processor (46) for modifying the player information stored in the data memory (26) of a portable data unit (20) inserted therein, in response to the selected machine data transmitted to the portable data unit (20) from the interface unit (40).

4. A system according to claim 1, wherein each portable data unit (20) comprises a processor (22) and each interface unit (40) comprises a processor (46), the processors (22, 46) cooperating to modify the player information stored in the data memory (26) of a portable data unit (20) received in an interface unit (40) in response to the selected machine data transmitted to the portable data unit (20) by the interface unit (40).

5. A system according to any preceding claim, in which the data memory (26) is a non-volatile random access memory.

6. A system according to any preceding claim, in which the interface units (40) are included within the outer housings of the game machines (10).

7. A system according to any preceding claim, in which both the interface units (40) and the central data processor (82) comprise means for encrypting data transmitted to the portable data unit (20) and means for decrypting data transmitted from the portable data units (20).

8. A system according to any preceding claim, in which each interface unit (40) includes means for adding date and time information to the selected data.

9. A system according to any preceding claim, in which each interface unit (40) additionally includes a display (78) for displaying player information from a portable data unit (20) inserted therein.

10. A system according to any preceding claim, in which each portable data unit (20) has outer dimensions that correspond to a standard credit card.

11. A system according to any preceding claim, wherein each portable data unit (20) has a separate memory or memory area (26) configured to receive player information, play information and machine data.

12. A system according to claim 11, wherein the play information includes player account information including separate fields to identify, for each denomination of currency acceptable to the game machine, the number of games played, the amount of any winnings, the number of coins or tokens inserted into the game machine while the portable data unit (20) is inserted therein and the time played.

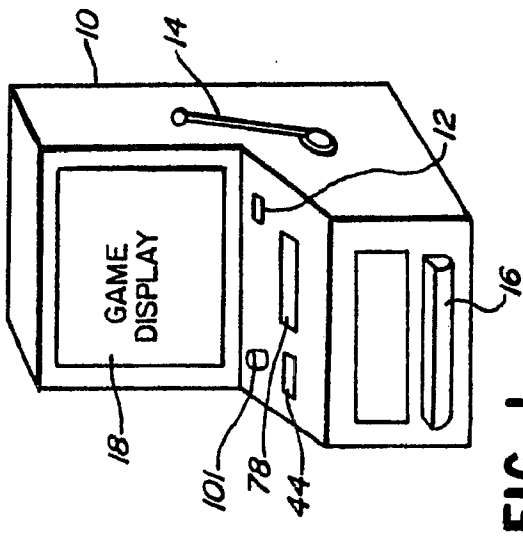


FIG. 2

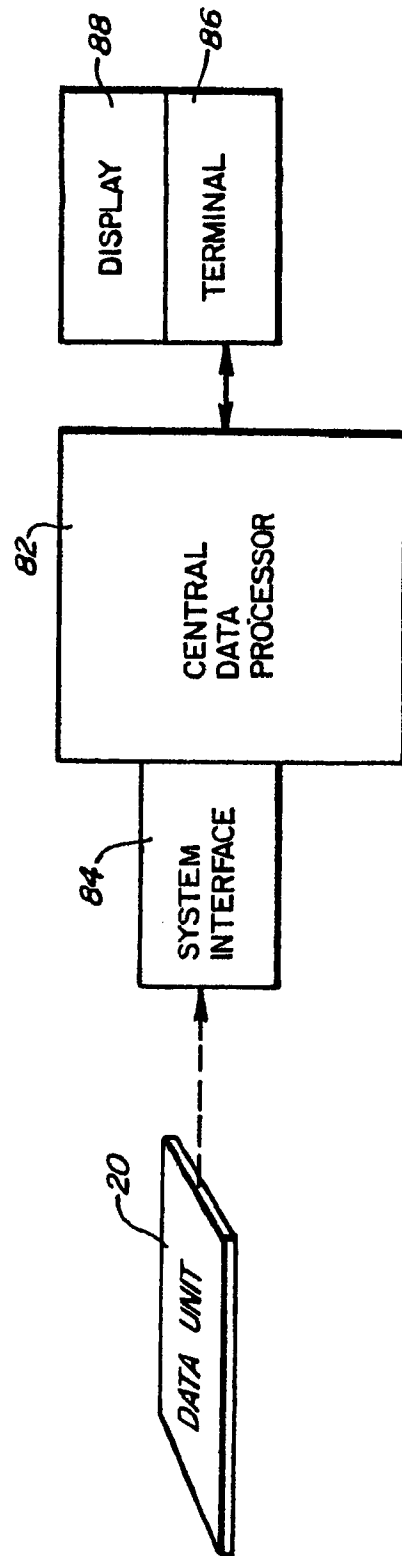
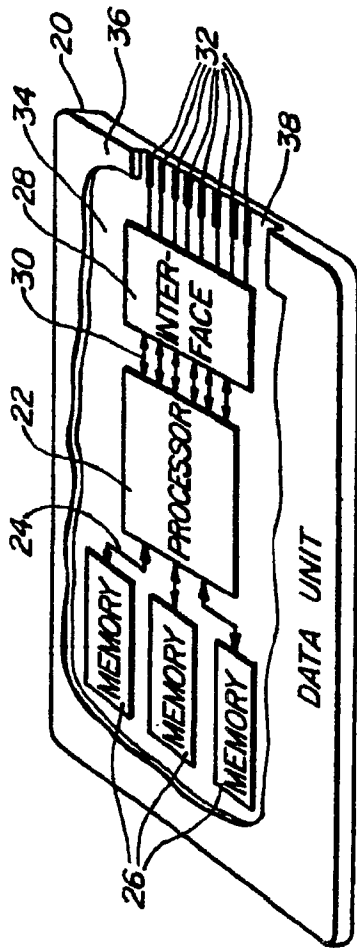


FIG. 4

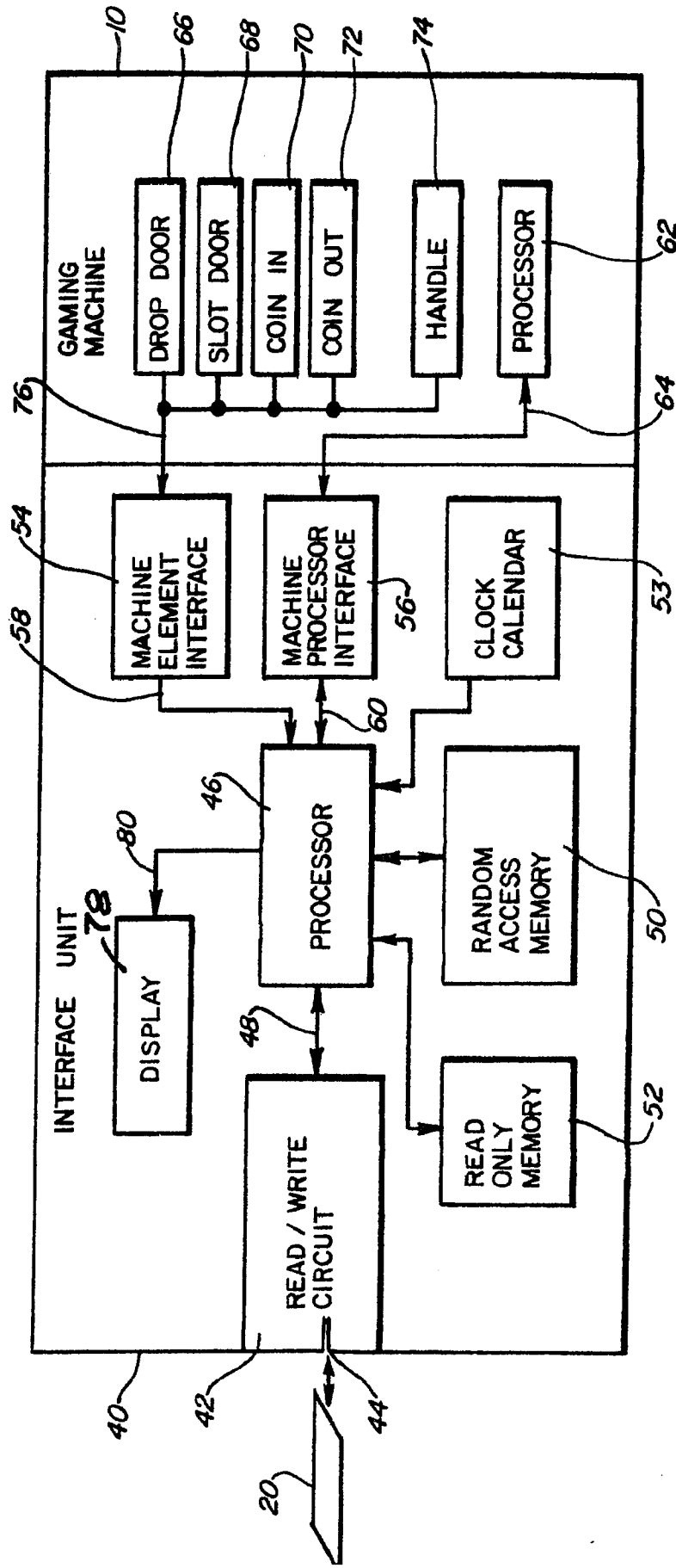


FIG. 3

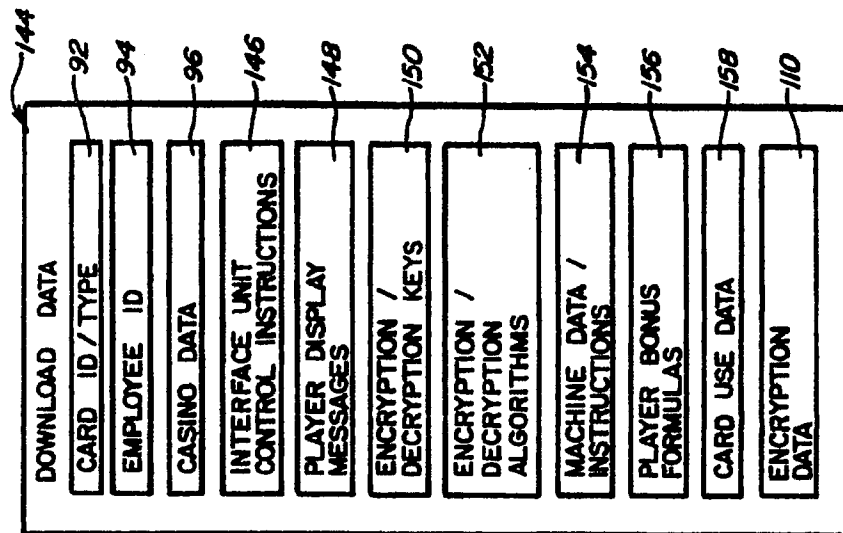


FIG. 7

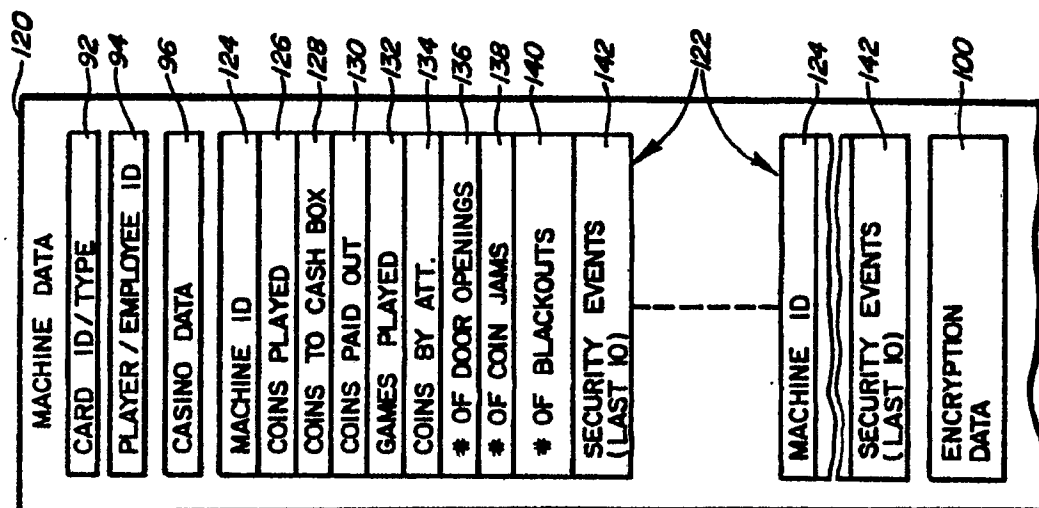


FIG. 6

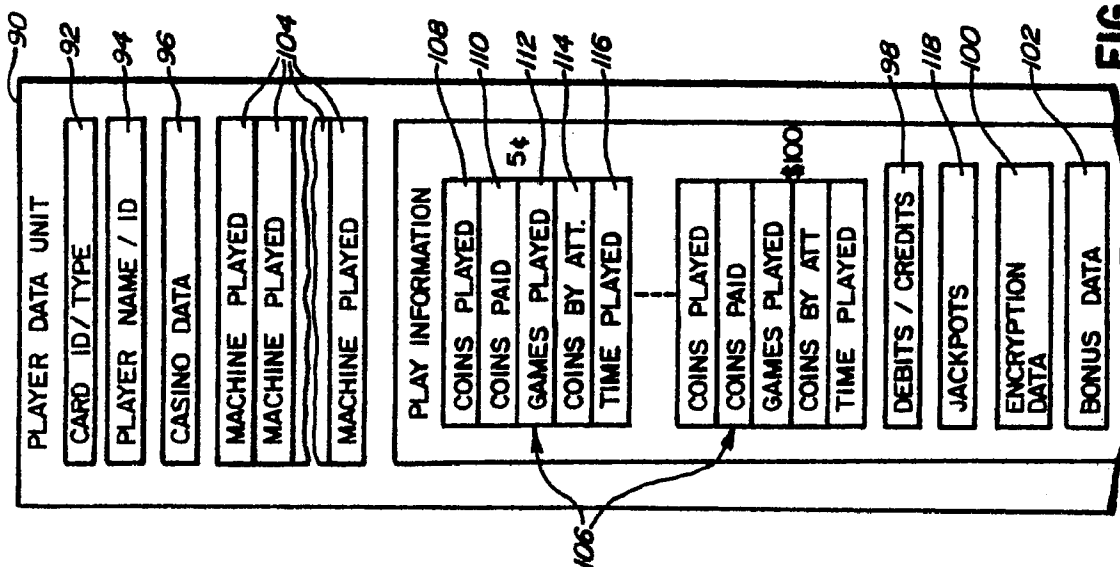


FIG. 5